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The present invention relates to a composition for the oxidation dyeing of keratin fibres, and in particular of human keratin fibres such as the hair, comprising at least one oxidation dye precursor
5 and optionally one or more couplers and at least one non ionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit.

It is known to dye keratin fibres, and in particular human hair, with dye compositions containing
10 oxidation dye precursors, which are generally known as "oxidation bases", in particular ortho- or para-phenylenediamines, ortho- or para-aminophenols and heterocyclic bases.

Oxidation dye precursors are compounds which
15 are initially colourless or only slightly coloured and which develop their dyeing power on the hair in the presence of oxidizing agents, leading to the formation of coloured compounds. The formation of these coloured compounds results either from an oxidative condensation
20 of the "oxidation bases" with themselves or from an oxidative condensation of the "oxidation bases" with colour-modifier compounds, or "couplers", which are generally present in the dye compositions used in oxidation dyeing and are represented more particularly
25 by meta-phenylenediamines, meta-aminophenols and meta-diphenols and certain heterocyclic compounds.

The variety of molecules used, which consists, on the one hand, of "oxidation bases" and, on

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the other hand, of "couplers", makes it possible to obtain a wide variety of colours.

In order to localize the oxidation dye product on the hair when it is applied, in order for it not to run onto the face or outside the areas which it is proposed to dye, use has been made hitherto of traditional thickeners such as crosslinked polyacrylic acid, hydroxyethylcelluloses or waxes or alternatively mixtures of nonionic surfactants with an HLB (hydrophilic-lipophilic balance) which, when suitably selected, gives rise to the gelling effect when they are diluted with water and/or surfactants.

However, the Applicant has observed that the ingredients of the traditional thickener, surfactant and solvent type generally curb the rise of the dye on the fibres, which is reflected in a dull shade and also in a larger use of dye, of solvent and/or of surfactants in order to dissolve the dye, if it is nevertheless desired to obtain an intense shade.

Moreover, the Applicant has also observed that after mixing with the oxidant, dye compositions containing the oxidation dye precursor or precursors and optionally the coupler or couplers, and also the said ingredients, lose some of their gelled nature and consequently give rise to undesirable running.

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After considerable research conducted in this matter, the Applicant has now discovered that it is possible to obtain oxidation dye compositions (after

mixing with the oxidants) which do not run and thus remain better localized at the point of application, and which also make it possible to obtain more intense or more chromatic (more luminous) shades, if an effective amount of a nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit is introduced (i) either into the composition containing the oxidation dye precursor or precursors and optionally the coupler or couplers [or composition (A)], or (ii) into the oxidizing compositions [or composition (B)], or (iii) into both compositions at once.

For the purposes of the present invention, the chromaticity (luminosity) is defined by the value c^* in the L^* , a^* , b^* colorimetric notation system of the Commission Internationale de l'Eclairage (C.I.E.). This value is equal to the square route of the sum $a^2 + b^2$ (+a is red, -a is green, +b is yellow, -b is blue). The shade is proportionately more luminous the greater the value of c^* .

In this notation system, L^* defines the intensity of the shade. The shade is proportionately more intense the lower the value of L^* (0=black, 100=white).

These discoveries form the basis of the present invention.

The subject of the present invention is thus a composition for the oxidation dyeing of keratin

fibres, in particular human keratin fibres such as the hair, of the type comprising, in a medium which is suitable for dyeing, at least one oxidation dye precursor (oxidation base) and, where appropriate, one or more couplers, which is characterized in that it also contains at least one nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit, with the proviso that the nonionic amphiphilic polymer is other than:

- 10 (a) a copolymer of polyethylene glycol (containing 20 EO) ether of stearyl alcohol and of one or more lower acrylic acid esters and/or lower methacrylic acid esters,
- (b) a copolymer of polyalkylene glycol ether of C_{16} - C_{22} alcohol and of one or more esters of C_{15} - C_{22} carboxylic acid.

By means of the present invention, it is also possible, advantageously, to reduce the consumption of surfactants, or even to dispense with them altogether.

20 The invention also makes it possible to decrease the amount of active dyestuffs used in the dye compositions, when compared with the standard techniques known in the prior art.

Another subject of the present invention
 25 relates to a ready-to-use composition for dyeing keratin fibres, which contains at least one oxidation dye precursor and optionally at least one coupler, and at least one nonionic amphiphilic polymer containing at

least one fatty chain and at least one hydrophilic unit as defined above, and an oxidizing agent.

The invention is also directed towards a process for dyeing keratin fibres, and in particular human keratin fibres such as the hair, which consists in applying to these fibres at least one composition (A1) containing, in a medium which is suitable for dyeing, at least one oxidation dye precursor and optionally at least one coupler, in combination with at least one nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit as defined above, the colour being developed at alkaline, neutral or acidic pH using an oxidizing agent which is mixed with the composition (A1) only at the time of use or which is present in a composition (B1) that is applied sequentially without intermediate rinsing.

The invention is also directed towards a variant of this process, which consists in applying to the fibres at least one composition (A2) containing, in a medium which is suitable for dyeing, at least one oxidation dye precursor and optionally at least one coupler, in the presence or absence of nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit as defined above, the colour being developed at alkaline, neutral or acidic pH using an oxidizing composition (B2) which contains an oxidizing agent and an effective amount of at least

one nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit as defined above, and which is mixed with the composition (A2) only at the time of use or which is applied sequentially without intermediate rinsing.

The subject of the invention is also multi-compartment "kits" or devices for dyeing, a first compartment of which contains at least one oxidation dye precursor, optionally at least one coupler and at least one nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit as defined above, and a second compartment of which contains an oxidizing agent.

According to another variant, the subject of the invention is also multi-compartment kits or devices for dyeing, a first compartment of which contains at least one oxidation dye precursor, optionally at least one coupler, in the presence or absence of nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit as defined above, and a second compartment of which contains an oxidizing agent and an effective amount of at least one nonionic amphiphilic polymer containing at least one fatty chain and at least one hydrophilic unit as defined above.

The invention also relates to the use of the oxidation dyeing composition defined above or to the use of a multi-compartment kit or device for dyeing as defined above for dyeing human keratin fibres such as

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the hair.

However, other characteristics, aspects, objects and advantages of the invention will become even more apparent on reading the description and the examples which follow.

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The nonionic amphiphilic polymers containing at least one fatty chain and at least one hydrophilic unit, which are used according to the invention, are preferably chosen from:

- 10 (1) celluloses modified with groups containing at least one fatty chain;

mention may be made, for example, of:

- hydroxyethyl celluloses modified with groups containing at least one fatty chain such as alkyl, arylalkyl or alkylaryl groups or mixtures thereof, and in which the alkyl groups are preferably C_8-C_{22} , such as the product Natrosol Plus Grade 330 CS (C_{15} alkyls) sold by the company Aqualon, or the product Bermocoll EHM 100 sold by the company Berol Nobel,

- 20 - those modified with polyalkylene glycol alkylphenyl ether groups, such as the product Amercell Polymer HM-1500 (polyethylene glycol (15) nonylphenyl ether) sold by the company Amerchol.

- (2) hydroxypropyl guar modified with groups containing at least one fatty chain, such as the product Esaflor HM 22 (C_{22} alkyl chain) sold by the company Lamberti, and the products Miracare XC95-3 (C_{14} alkyl chain) and RE205-1 (C_{20} alkyl chain) sold by the company Rhône-

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(3) polyether urethanes containing at least one fatty chain such as C₈-C₃₀ alkyl or alkenyl groups, for instance the products Dapral T210 and Dapral T212 sold by the company Akzo.

(4) copolymers of vinylpyrrolidone and of hydrophobic monomers containing a fatty chain; mention may be made, for example, of:

- the products Antaron V216 or Ganex V216 (vinylpyrrolidone/hexadecene copolymer) sold by the company ISP

- the products Antaron V220 or Ganex V220 (vinylpyrrolidone/eicosene copolymer) sold by the company ISP.

(5) copolymers of C₈-C₃₀ alkyl methacrylates or acrylates and of amphiphilic monomers containing at least one fatty chain, such as, for example, the oxyethylenated methyl methacrylate/stearyl acrylate copolymer sold by the company Goldschmidt under the name Antil 208.

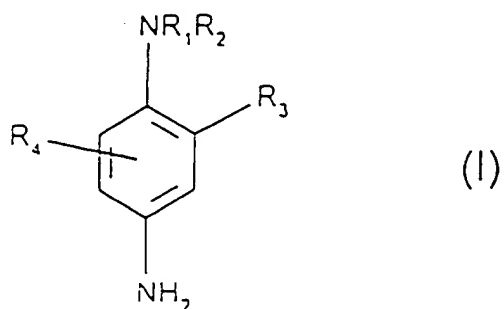
(6) copolymers of hydrophilic methacrylates or acrylates and of hydrophobic monomers containing at least one fatty chain, such as, for example, the polyethylene glycol methacrylate/lauryl methacrylate copolymer.

The nonionic amphiphilic polymers containing at least one fatty chain and at least one hydrophilic unit according to the invention are preferably used in an amount which may range approximately from 0.05 to

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10% by weight relative to the total weight of the dye composition applied to the fibres. More preferably, this amount varies approximately from 0.2 to 5% by weight.

5 The oxidation dye precursors which may be used in the context of the present invention are chosen from those conventionally known in oxidation dyeing, and among which mention may be made in particular of:
 - para-phenylenediamines of formula (I) below, and the
 10 addition salts thereof with an acid:



in which:

R_1 represents a hydrogen atom or a C_1 - C_4 alkyl, C_1 - C_4 monohydroxyalkyl, C_2 - C_4 polyhydroxyalkyl or 4'-aminophenyl radical,

15 R_2 represents a hydrogen atom or a C_1 - C_4 alkyl, C_1 - C_4 -monohydroxyalkyl or C_2 - C_4 polyhydroxyalkyl radical,

R_3 represents a hydrogen atom, a halogen atom such as a chlorine atom, or a C_1 - C_4 alkyl, sulfo, carboxyl, C_1 - C_4 monohydroxyalkyl or C_1 - C_4 hydroxyalkoxy radical,

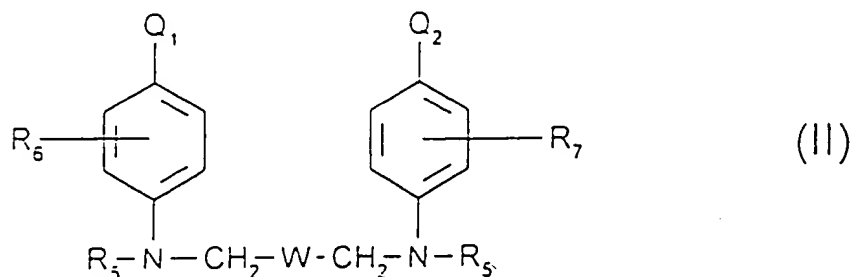
20 R_4 represents a hydrogen atom or a C_1 - C_4 alkyl radical.

Among the para-phenylenediamines of formula (I) above, mention may be made more particularly of para-phenylenediamine, para-toluylenediamine, 2-chloro-para-phenylenediamine, 2,3-dimethyl-para-phenylene-
 5 diamine, 2,6-dimethyl-para-phenylenediamine, 2,6-diethyl-para-phenylenediamine, 2,5-dimethyl-para-phenylenediamine, N,N-dimethyl-para-phenylenediamine, N,N-diethyl-para-phenylenediamine, N,N-dipropyl-para-phenylenediamine, 4-amino-N,N-diethyl-3-methyl-aniline,
 10 N,N-bis(β -hydroxyethyl)-para-phenylenediamine, 4-amino-N,N-bis(β -hydroxyethyl)-3-methylaniline, 4-amino-3-chloro-N,N-bis(β -hydroxy-ethyl)aniline, 2- β -hydroxyethyl-para-phenylenediamine, 2-fluoro-para-phenylenediamine, 2-isopropyl-para-phenylenediamine, N-
 15 (β -hydroxypropyl)-para-phenylene-diamine, 2-hydroxymethyl-para-phenylenediamine, N,N-dimethyl-3-methyl-para-phenylenediamine, N-ethyl-N-(β -hydroxyethyl)-para-phenylenediamine, N-(β,γ -dihydroxypropyl)-para-phenylenediamine, N-(4'-aminophenyl)-para-
 20 phenylenediamine, N-phenyl-para-phenylenediamine and 2- β -hydroxyethyloxy-para-phenylene-diamine, and the addition salts thereof with an acid.

Among the para-phenylenediamines of formula (I) above, para-phenylenediamine, para-toluylene-
 25 diamine, 2-isopropyl-para-phenylenediamine, 2- β -hydroxyethyl-para-phenylenediamine, 2- β -hydroxyethyloxy-para-phenylenediamine, 2,6-dimethyl-para-phenylenediamine, 2,6-diethyl-para-phenylenediamine,

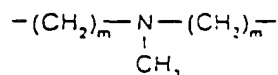
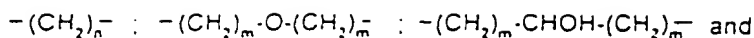
2,3-dimethyl-para-phenylenediamine, N,N-bis(β -hydroxyethyl)-para-phenylenediamine and 2-chloro-para-phenylenediamine, and the addition salts thereof with an acid are most particularly preferred.

- 5 - the bis(phenyl)alkylenediamines corresponding to formula (II) below, and the addition salts thereof with an acid:



in which:

- Q_1 and Q_2 , which may be identical or different,
 10 represent a hydroxyl radical or a radical NHR_8 in which R_8 represents a hydrogen atom or a C_1 - C_4 alkyl radical, R_5 represents a hydrogen atom, a C_1 - C_4 alkyl, C_1 - C_4 monohydroxyalkyl or C_2 - C_4 polyhydroxy alkyl radical or a C_1 - C_4 aminoalkyl radical in which the amino residue may
 15 be substituted,
 R_6 and R_7 , which may be identical or different, represent a hydrogen or halogen atom or a C_1 - C_4 alkyl radical,
 W represents a radical taken from the group consisting
 20 of the following radicals:



in which n is an integer between 0 and 8 inclusive and m is an integer between 0 and 4 inclusive.

Among the bis(phenyl)alkylenediamines of formula (II) above, mention may be made more particularly of N,N'-bis(β-hydroxyethyl)-N,N'-bis(4'-aminophenyl)-1,3-diamino-2-propanol, N,N'-bis(β-hydroxyethyl)-N,N'-bis(4'-aminophenyl)ethylene-diamine, N,N'-bis(4-aminophenyl)tetramethylenediamine, N,N'-bis(β-hydroxyethyl)-N,N'-bis(4-aminophenyl)tetramethylenediamine, N,N'-bis(4-methylaminophenyl)tetramethylenediamine and N,N'-bis(ethyl)-N,N'-bis(4'-amino-3'-methylphenyl)ethylenediamine, and the addition salts thereof with an acid.

Among these bis(phenyl)alkylenediamines of formula (II), N,N'-bis(β-hydroxyethyl)-N,N'-bis(4'-aminophenyl)-1,3-diamino-2-propanol or one of the addition salts thereof with an acid is particularly preferred.

- the para-aminophenols corresponding to formula (III) below, and the addition salts thereof with an acid:



R₉ represents a hydrogen atom or a C₁-C₄ alkyl, C₁-C₄ monohydroxyalkyl, (C₁-C₄)alkoxy(C₁-C₄)alkyl, C₁-C₄ aminoalkyl or hydroxy(C₁-C₄)alkyl amino(C₁-C₄)alkyl radical,

R₁₀ represents a hydrogen or fluorine atom or a C₁-C₄ alkyl, C₁-C₄ monohydroxyalkyl, C₂-C₄ polyhydroxy-alkyl, C₁-C₄ aminoalkyl, C₁-C₄ cyanoalkyl or (C₁-C₄)alkoxy(C₁-C₄)alkyl radical,

it being understood that at least one of the radical R₉ or R₁₀ represents a hydrogen atom.

sub B2a Among the para-aminophenols of formula (III) above, mention may be made more particularly of para-aminophenyl, 4-amino-3-methylphenol, 4-amino-3-fluoro-phenol, 4-amino-3-hydroxymethylphenol, 4-amino-2-methylphenol, 4-amino-2-hydroxymethylphenol, 4-amino-2-methoxymethylphenol, 4-amino-2-aminomethylphenol and 4-amino-2-(β -hydroxyethylaminomethyl)phenol, and the addition salts thereof with an acid.

20 - the ortho-aminophenols which may be used as oxidation
bases in the context of the present invention are

chosen in particular from 2-aminophenol, 2-amino-1-hydroxy-5-methylbenzene, 2-amino-1-hydroxy-6-methylbenzene and 5-acetamido-2-aminophenol, and the addition salts thereof with an acid.

5 - the heterocyclic bases which may be used as oxidation bases in the context of the present invention are chosen in particular from pyridine derivatives, pyrimidine derivatives and pyrazole derivatives, and the addition salts thereof with an acid.

10 Among the pyridine derivatives, mention may be made more particularly of the compounds described, for example, in patents GB-1,026,978 and GB-1,153,196, such as 2,5-diaminopyridine, and the addition salts thereof with an acid.

15 Among the pyrimidine derivatives, mention may be made more particularly of the compounds described, for example, in German patent DE-2,359,399 or Japanese patents JP-88-169,571 and JP-91-333,495, such as 2,4,5,6-tetraaminopyrimidine and 4-hydroxy-2,5,6-tri-
20 aminopyrimidine, and the addition salts thereof with an acid.

Among the pyrazole derivatives, mention may be made more particularly of compounds described in patents DE-3,843,892 and DE-4,133,957 and patent
25 applications WO-94/08969 and WO-94/08970, such as 4,5-diamino-1-methylpyrazole, 3,4-diaminopyrazole and 4,5-diamino-1-(4'-chlorobenzyl)pyrazole, and the

addition salts thereof with an acid.

According to the invention, the oxidation base or bases preferably represent from 0.0005 to 12% by weight approximately relative to the total weight of the composition (A) and even more preferably from 0.005 to 6% by weight approximately.

The couplers which may be used in the dyeing process according to the invention are those conventionally used in oxidation dye compositions, that is to say meta-phenylenediamines, meta-aminophenols and meta-diphenols, mono- or polyhydroxynaphthalene derivatives, sesamol and derivatives thereof and heterocyclic compounds such as, for example, indole couplers, indoline couplers and pyridine couplers, and the addition salts thereof with an acid.

These couplers may be chosen in particular from 2-methyl-5-aminophenol, 5-N-(β -hydroxyethyl)amino-2-methylphenol, 3-aminophenol, 1,3-dihydroxybenzene, 1,3-dihydroxy-2-methylbenzene, 4-chloro-1,3-dihydroxybenzene, 2,4-diamino-1-(β -hydroxyethyloxy)benzene, 2-amino-4-(β -hydroxyethylamino)-1-methoxybenzene, 1,3-diaminobenzene, 1,3-bis(2,4-diaminophenoxy)propane, sesamol, α -naphthol, 6-hydroxyindole, 4-hydroxyindole, 4-hydroxy-N-methylindole, 6-hydroxyindoline, 2,6-dihydroxy-4-methylpyridine, 1-H-3-methylpyrazol-5-one and 1-phenyl-3-methylpyrazol-5-one, and the addition salts thereof with an acid.

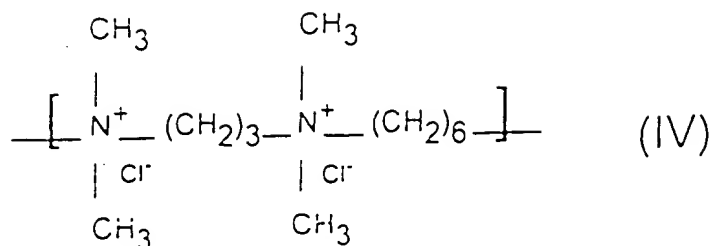
When they are present, these couplers

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5 In general, the addition salts with an acid
of the oxidation bases and couplers are chosen in
particular from the hydrochlorides, hydrobromides,
sulphates, tartrates, lactates and acetates.

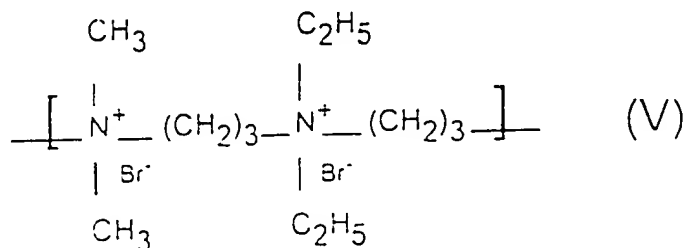
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cation

20 the quaternary polyammonium polymers prepared and described in French patent 2,270,846, consisting of repeating units corresponding to formula (IV) below:



and the molecular weight of which, determined by gel permeation chromatography, is between 9500 and 9900;

- the quaternary polyammonium polymers prepared and described in French patent 2,270,846, consisting of repeating units corresponding to formula (V) below:



and the molecular weight of which, determined by gel permeation chromatography, is about 1200.

- The medium for composition (A) which is suitable for dyeing is preferably an aqueous medium consisting of water and may optionally contain cosmetically acceptable organic solvents including, more particularly, alcohols such as ethyl alcohol, isopropyl alcohol, benzyl alcohol or phenylethyl alcohol, or glycols or glycol ethers such as, for example, ethylene glycol monomethyl, monoethyl and

monobutyl ethers, propylene glycol or ethers thereof such as, for example, propylene glycol monomethyl ether, butylene glycol, dipropylene glycol and diethylene glycol alkyl ethers such as, for example, 5 diethylene glycol monoethyl ether or monobutyl ether, in concentrations of approximately between 0.5 and 20% and, preferably, approximately between 2 and 10% by weight relative to the total weight of the composition.

The composition (A) may also contain an 10 effective amount of other agents, which are moreover previously known in oxidation dyeing, such as various common adjuvants, for instance sequestering agents, hair conditioners, silicones, preserving agents, opacifiers, etc., and optionally anionic, cationic, 15 nonionic, amphoteric or zwitterionic surfactants or mixtures thereof.

The said composition may also contain antioxidants. These may be chosen in particular from sodium sulphite, thioglycolic acid, thiolactic acid, 20 sodium bisulphite, dehydroascorbic acid, hydroquinone, 2-methylhydroquinone, tert-butylhydroquinone and homogentisic acid, and they are then generally present in amounts ranging approximately from 0.05 to 1.5 % by weight relative to the total weight of the composition.

25 Obviously, a person skilled in the art will take care to select the optional complementary compound or compounds mentioned above such that the advantageous properties intrinsically associated with the dye

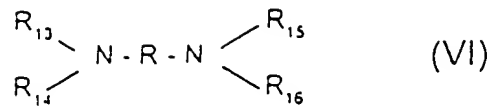
composition according to the invention are not, or are not substantially, adversely affected by the addition or additions envisaged.

In the composition (B), the oxidizing agent
5 is preferably chosen from urea peroxide, alkali metal bromates or ferricyanides, and persalts such as perborates and persulphates. The use of hydrogen peroxide is particularly preferred.

The composition (B) advantageously consists
10 of an aqueous hydrogen peroxide solution whose titre may range, more particularly, approximately from 2.5 to 40 volumes and, even more preferably, approximately from 5 to 20 volumes.

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15 ~~The pH of the ready-to-use composition applied to the keratin fibres [composition resulting from mixing together the dye composition (A) and the oxidizing composition (B)] is generally between the values 4 and 11. It is preferably between 6 and 10, and may be adjusted to the desired value by means of~~
20 ~~acidifying or basifying agents that are well known in the state of the art in the dyeing of keratin fibres.~~

Among the basifying agents which may be mentioned, by way of example, are aqueous ammonia, alkali metal carbonates, alkanolamines such as mono-,
25 di- and triethanolamines and derivatives thereof, sodium hydroxide, potassium hydroxide and the compounds of formula (VI) below:



in which R is a propylene residue optionally substituted with a hydroxyl group or a C₁-C₄ alkyl radical; R₁₃, R₁₄, R₁₅ and R₁₆, which may be identical or different, represent a hydrogen atom or a C₁-C₄ alkyl or C₁-C₄ hydroxyalkyl radical.

The acidifying agents are conventionally, by way of example, inorganic or organic acids such as hydrochloric acid, orthophosphoric acid, carboxylic acids such as tartaric acid, citric acid or lactic acid, or sulphonic acids.

The dyeing process according to the invention preferably consists in applying a mixture, which is prepared as required at the time of use from the compositions (A) and (B) described above, onto the dry or wet keratin fibres and in leaving the mixture to act for an exposure period preferably ranging from 1 to 60 minutes approximately, and more preferably from 10 to 45 minutes approximately, in rinsing the fibres, then in optionally washing them with shampoo and then rinsing them again and drying them.

Concrete examples illustrating the invention will now be given without, however, being limiting in nature.

EXAMPLE 1:

The following dye composition, in accordance with the invention, was prepared:

	NATROSOL PLUS GRADE 330 CS (Aqualon).....	1.0 g
5	Oleic acid.....	3.0 g
	Aqueous sodium bisulphite solution containing 35% AM*.....	0.45 g AM*
	Para-phenylenediamine.....	0.162g
	Resorcinol.....	0.165g
	Aqueous ammonia (20% NH ₃).....	11.5 g
10	Sequestering agent.....	q.s
	Water.....	q.s.p... 100 g
	AM* = active material	

At the time of use, this composition was mixed weight for weight with a 20-volumes aqueous hydrogen peroxide solution and the mixture obtained was then applied to locks of permanent-waved hair containing 90% white hairs. After leaving to stand on the locks for 30 minutes, they were rinsed and then washed with a shampoo, rinsed again and then dried.

Using an I.C.S. spectrophotometer, the value L* in the L*, a*, b* international colour notation system from C.I.E. was measured.

The result was as follows: L* = 32.19

COMPARATIVE EXAMPLE 2:

Example 1 was repeated, replacing 1 gram of nonionic amphiphilic polymer (Natrosol Plus Grade 330 CS) by the mixture of the following two nonionic

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Conclusion: the shade obtained according to the invention is more intense (lower L*) than that obtained according to the prior art.